BACHELOR THESIS

ARE WE AFFECTED IN EMOTION BY PSYCHOLOGICAL DISTANCE? AN
ANALYSIS OF EMOTION IN TWEETS REGARDING AVIATION CRASHES MH17 & MH370.

Steven van de Lisdonk - 4639170

s.vandelisdonk@student.ru.nl

tel. +31650511853

Pre-Master Student Communication & Behaviour

Radboud University Nijmegen

2017

Under guidance of L. van Lent & G.Reijnierse

*NL Title: Beïnvloed psychologische afstand onze emoties op Twitter? Een analyse van
emotie in Tweets in verband met de vliegtuigrampen MH17 en MH370.*

Abstract

The present research used the Construal Level Theory by Trope & Liberman (2008) as a fundamental pillar to determine if psychological distance has any impact on human sentiment expressed on Twitter. We used aviation disasters MH370 and MH17 (both Malaysian Airlines) as stimuli and focussed our point of view on The Netherlands and their Twitter users. Tweets were coded for emotions 1) Grief and 2) Disbelief. Both emotions are related to the death and dying and are phases of the Grief Cycle Curve by Kübler-Ross (in: Tsao, 2010). In this curve, disbelief is the first phase of mourning and grief the final phase of mourning, which indicates grief is a more severe emotional outing. Therefore, we expected grief to be connected with proximal stimuli and disbelief to be connected with distal stimuli. As expected, grief had a significant relation with distance but disbelief was not significant related with distance. Furthermore, we discussed the possibilities for governments and businesses to use sentiment analysis to their advance in order to recognize close or distal stimuli and the possibility that recognition of close and distal stimuli brings to respond better on certain events with dedicated media strategies.

Introduction

In March 2014, Malaysian Airlines flight MH370 disappeared near Vietnam. According to official boarding documents by Malaysian Airlines, 227 passengers and 12 crewmembers did not survive. 1 of 227 passengers was in possession of the Dutch nationality (0,5% of total passengers). On July 17, 2014 another Malaysian Airlines flight (MH17) crashed in Ukraine. According to official boarding documents by Malaysian Airlines, 283 passengers and 15 crewmembers did not survive. 196 of those 283 passengers were in possession of the Dutch nationality (69% of total passengers). The MH17 crash had a major impact on social media in the Netherlands (785.301 Tweets in the entire TwinNL database for #MH17, https://twinl.surfsara.nl/) whereas MH370 had a smaller impact on the same channel (42.095 Tweets in the entire TwinNL database for #MH370, https://twinl.surfsara.nl/). To illustrate the difference, Dutch citizens were tweeting nineteen times as much regarding MH17 in contrast to MH370. The Construal Level Theory (CLT) of Psychological Distance can explain this difference.

According to Trope, Liberman and Stephan (2007) psychological distance affects the experience and opinion of stimuli for a person. The closer stimuli are, the more important these stimuli are for a person. The more distal stimuli are, the less important these stimuli are for a person (Trope, Liberman & Stephan, 2007). Therefore, we assume that MH17 is the more important and psychologically closer crash for Dutch citizens. In the following paragraphs, we will further discuss the CLT of Psychological Distance and why MH17 is assumed to be the more important and psychologically closer crash for Dutch citizens. The current study primarily focuses on the question whether there are differences in the expression of emotion in Tweets regarding close and distal stimuli.

There are multiple previous studies (e.g. Mollema et al., 2015; Van Lent et al., 2017; Stokes et al., 2016; Wang, Ye & Tsou, 2016) that researched other disasters (e.g. disease outbreaks and natural disasters) and psychological distance in combination with responses on Twitter. However, these studies are not based on aviation disasters, the psychological closeness of stimuli and emotional sentiment expressed on Twitter. Furthermore, most studies on CLT have an experimental approach while there is, to our knowledge, only a single study (Van Lent et al., 2017) that used a real-time corpus analysis (on Twitter) to examine effects in sentiment. Van Lent et al. (2017) only studied a fear sentiment and when a fear sentiment, regarding Ebola, occurred in the Netherlands during the 2014 Ebola outbreak in Africa. It is important for governments

to understand a possible relation between CLT and emotional sentiment in Tweets with regard to aviation crashes, in order to be able to organise better (social) media strategies in case of aviation disasters. For instance, in 2014 relatives of Chinese MH370 victims were protesting at the embassy because of too little information (Algemeen Dagblad, 2014) shared by official agencies. Knowing whether sentiment is being affected by psychological distance, will make it easier for governments to determine which events will stir a society or country and thereby are worth developing (social) media strategies for to inform the public better.

Construal Level Theory of Psychological Distance
The Construal Level Theory is a psychological theory that binds certain psychological stimuli (e.g. events, people, and news) with psychological closeness and how people experience these stimuli (Trope & Liberman, 2008). According to the CLT of Trope and Liberman (2010) we can define psychological distance as subjective stimuli associated with being proximal or distant from a person. The CLT is centred around a person's *self, here and now* (Trope & Liberman, 2008). Trope and Liberman (2008) state: "an object is psychological[ly] distant from us, people, to the extent that it is remote in time (future or past) or in space". Psychological distance is divided into four dimensions: spatial, temporal, social and hypothetical distance (Trope & Liberman, 2008). The most relevant dimensions of psychological distance for this study are spatial and social distance. Spatial distance is literally taken as Vietnam (MH370) is further removed in space from the Netherlands than Ukraine (MH17) is. Therefore, Dutch citizens will feel psychologically closer to MH17 because the crash was closer. Humans will feel psychologically closer to friends or people with a similar culture than relatively unknown people or relatively unknown cultures as well (social distance, Trope & Liberman, 2008). The social distance for citizens of the Netherlands was closer for MH17 because of all the Dutch casualties (69% vs. 0,5% Dutch casualties). Furthermore, humans feel psychologically closer to the present instead of the future (temporal distance, Trope & Liberman, 2008). This dimension is irrelevant for this study because this study is focussed on Tweets (published in the week of the crash), which are real-time on the moment they are published. Humans will feel psychologically closer to stimuli with a higher probability of happening than to stimuli with a lower probability of

happening (hypothetical distance, Trope & Liberman, 2008). Hypothetical distance is also irrelevant in this study, because both crashes did happen.

Further research by Trope and Liberman (2010) also suggests that psychological distance causes people to think differently in ways of abstractness and concreteness of stimuli. The CLT distinguishes low-level construals and high-level construals (Trope & Liberman, 2008). Trope and Liberman (2008) argue that more distant stimuli are generic, schematic, decontextualized and abstract representations of events (i.e. high-level construal) whilst proximal stimuli are more detailed, contextualized and concrete representations of events (i.e. low-level construal). Stimuli can appear in likeness of words and pictures (Amit & Algom, 2009). Amit and Algom (2009) showed with their study that words are more likely to be perceived as abstract and distal, whilst pictures and videos are more likely to be perceived as concrete and proximal. In our case, the crash site of MH17 has been shown many times on pictures and videos in The Netherlands. MH370's crash site has never been found, only small debris was found, which makes MH370 a more written news case and therefore more abstract and distal.

Given the evidence in the literature, we take MH17 as the closer and more concrete crash for Dutch citizens. The aforementioned studies focussed mainly on when people experience stimuli as psychologically close or distal and when or why stimuli are experienced as more concrete or abstract. None of the aforementioned studies were focussed on the effect psychological distance might have on human sentiment expressed in Tweets with regard to aviation disasters, like MH17 or MH370.

Sentiment analysis on real-time Twitter reactions
In this study we primarily focus on emotions *disbelief and grief.* Both crashes involved many fatal casualties; therefore, emotions associated with death and dying seem appropriate. We used two similar emotions that are linked to the same theme and are included in a level system (steps of severity). We choose emotions disbelief and grief through Kübler-Ross's Grief Cycle Curve (in: Tsao, 2010). The Grief Cycle Curve of Kübler-Ross is based on personal trauma, grief and grieving, associated with death and dying. Kübler-Ross's Grief Cycle Curve (in: Tsao, 2010) distinguishes five stages of grief, varying from denial (disbelief) to depression (grief). Kübler-Ross (in: Tsao, 2010) states that denial is the first stage and grief is the fifth stage of mourning. Therefore, we see grief as a more severe and heavier emotion of mourning than disbelief is. We expect

4

severe emotions to be connected with close stimuli because of the aforementioned CLT, where close stimuli are more important to persons than distal stimuli (Trope & Liberman, 2008). On the other hand, we expect less severe emotions to be connected with distal stimuli.

The present research uses Twitter to examine potential differences in emotional reactions on close and distal stimuli with regard to the two crashes. According to Mollema et al. (2015) Twitter is eminently suited to track the public's opinion. The bureau for statistics (CBS, 2017) in The Netherlands also recently announced a sentiment analysis strategy on Twitter to track the public's opinion. The CBS states that is important to use real-time tools to measure the public's opinion and to measure potential tension in the Netherlands. July 17, 2014 (i.e. crash day MH17) also peaked in their perimeters of 2014, while March 8, 2014 (i.e. disappearance day MH370) did not stand out in their data. Other studies praise Twitter for its highly engaging users on topics (Philander & Zhong, 2016) and the fact that Twitter grants access to user behaviours, thoughts and feelings that may be representative of emotional well-being (Conway & O'Connor, 2016). Therefore, Twitter seems appropriate for this study to measure possible differences in the usage of grief and disbelief with regard to MH17 and MH370.

Overview & hypothesis

With 196 Dutch citizens on board, MH17 is one of the most remarkable tragedies of recent Dutch history. However, both crashes (MH17 and MH370) had an impact on Dutch society, given the large concentration of comments on social media (https://twinl.surfsara.nl/). We therefore used Twitter to analyse the public's opinion on MH17 and MH370. The Construal Level Theory states that people are more likely to feel and think differently about events (stimuli) that are spatially or socially closer than about events that are distal on these dimensions (Trope & Liberman, 2008, Trope & Liberman, 2010, Van Boven et al., 2010). With all aforementioned studies taken in consideration, we assume MH17 is the closer and more concrete crash while MH370 is the more distal and abstract crash for Dutch citizens. It remains unclear if psychological distance has an impact on sentiment expressed by Dutch citizens in Tweets on aviation disasters. The main research question and hypotheses of this research are as follows:

In what way did comments in grief and disbelief with regard to the Malaysian Airlines crashes MH17 and MH370 differ between Dutch citizens on Twitter?

H1: Dutch citizens express themselves with the sentiment grief more often when an aviation disaster is psychologically closer.

H2: Dutch citizens express themselves with the sentiment disbelief more often when an aviation disaster is psychologically more distal.

Method

Material

Because comments regarding Malaysian Airlines crashes on social media platform Twitter are key for this research, corpuses for MH17 and MH370 were built. Because the Netherlands is our point of view, only Dutch Tweets were gathered. Data were collected with Twitter mining application Twinl.Surfsara.nl. In this research we used a similar approach as Van Lent et al. (2017) and Mollema et al. (2015) used in their previous studies with regard to similar disaster cases. In this empirical study we searched for tweets containing stimuli (keywords, hashtags) on the Malaysian Airline crashes and divided them into two different corpora. Corpus 1 (MH17): tweets were searched based on the following keywords and hashtags: MH17 and #MH17. For MH17, a total of 226,498 Dutch Tweets were gathered from July 17, 2014 (day of crash) to July 24, 2014**.** Corpus 2 (MH370): MH370 and #MH370. For MH370, a total of 1811 Dutch Tweets were gathered from March 8, 2014 (day of disappearance) to March 15, 2014. A one-week period was chosen because it is more likely these Tweets are direct reactions on the aviation disasters instead of reactions on side effects of these disasters (e.g. reactions on news of new small details or actions taken by governments). One should realize that there are Tweets referencing the crashes without using these keywords. However, these keywords will be sufficient enough to build a strong sample for this research.

Theoretically, coders could have examined all tweets that contained at least one of these keywords. In the end, a simple random sample of 1500 Tweets for both cases was hand-coded by 5 different coders who each coded 400 Tweets per case, with 100 Tweets overlap with the previous coder to test for reliability between coders. We

revised irregularities between coders. Reliability was calculated with Cohen's Kappa (κ) for every emotion.

Procedure

Coders coded Tweets in both corpora for grief, disbelief and irrelevance. Coders followed a three-step procedure. Only yes or no was applicable. First, they coded Tweets for irrelevance (see table 1). Tweets are irrelevant when written in another language or when it was not evident enough that they are reactions on MH17 or MH370. When a yes was granted for irrelevance, these tweets were irrelevant for this research and were not coded for grief and disbelief. In the end, 18 Tweets for MH17 and 58 Tweets for MH370 were coded as irrelevant. In case a no was granted, coders coded these Tweets for grief and disbelief. To the best of our knowledge there are no previous studies based on these emotions in relation to (aviation) disasters. Therefore, grief and disbelief were coded with referral to their meanings in the Oxford's dictionary (2017), as shown in table 2 and table 3. As agreed with all coders in preliminary meetings, when coders were in doubt a no was granted.

When irregularities occurred between two coders, we made the definitive coding ourselves. For instance, some Tweets that were written in South-African were coded as relevant. We changed those to irrelevant because they were not written in Dutch. Also, many irregularities occurred between coders when people were offering condolences for the relatives of the victims. In this case we changed those irregularities to no grief because it is not the suffering of those who are tweeting, but these condolences are meant to support the ones who lost relatives. For disbelief, many irregularities occurred around Tweets where authors clearly believed something happened. Following our definitions that should not be coded for disbelief. See the appendix for full accountability of all the irregularities we revised. Intercoder reliability for grief was moderate (Cohen's κ= .558, *p*<.001; Landis & Koch, 1977, p.165), intercoder reliability for disbelief was slight (Cohen's κ= .156, *p*<.001; Landis & Koch, 1977, p.165) and intercoder reliability for irrelevance was substantial (Cohen's κ= .682, *p*<.001; Landis & Koch, 1977, p.165). Intercoder reliability was tested before we revised irregularities.

Table 1.   Irrelevance.   Description when and why to code for irrelevance.

Category: Irrelevance	Description	Keywords & Examples
Yes	1) Tweets are irrelevant when they are written in a different language than Dutch or 2) Tweets are irrelevant when there is no clear and demonstrable link between a Tweet and MH17 or MH370.	1) RT @user: "hardly evidence w/o satpics NEW: U.S. publishes trajectory of missile it says downed MH17. " 2) @user:" niet gelukt... Zit sinds MH17 weer op twitter.. :) komt wel..."
No	1) Tweets are relevant when written in Dutch and 2) Tweets are relevant when there is a clear demonstrable link between Tweet and MH17 or MH370.	1) @user: "Het weten en beseffen is 1 ding, maar de beelden vanuit Eindhoven komen pas echt hard binnen. R.I.P. #MH17 .. Zeer indrukwekkende ceremonie." 2) @user: "Laten we hopen dat onze mensen heel snel terug in Nederland zijn!! #MH17 r.i.p"

Table 2.   Grief.   Description of grief and when to code for grief or not.

Category: Grief	Description:	Keywords & Examples
Yes	Mild sadness to "Intense sorrow, especially caused by someone's death" (Oxford Dictionary, 2017).	E.g. *1). zo erg (so sad) 3). huilen (crying) 4). Rouw (mourning) 6). Ik mis .. (I Miss..) 7). Het doet pijn dat ... (it hurts so much) 8). Signalen van leed (signals of suffering)*

		1) RT @user: "Rust zacht lieve Jennifer. Ik ga je missen. #MH17"
No	Tweets that do not contain any signals of intense emotional suffering (over a loss).	E.g. 1) @user: "The Russians are to blame for MH17. It's crazy! " 2) @user: "Why did KLM fly over Ukraine when it's forbidden territory #MH17." 3) @user: "This did not really happen right?? #MH17"

Table 3.   Disbelief. Description of disbelief and when to code for disbelief or not.

Category: Disbelief	Description	Keywords & Examples
Yes	"Inability or refusal to accept that something [the airplane crashes] is true or real" (Oxford Dictionary, 2017).	E.g. 1). Ik geloof het niet (Can't believe) 2). Kan niet waar zijn (it is not true) 3). Ongeloof (disbelief) 4). Wantrouwen (distrust) 5). Elke aanwijzing die lijkt op afwijzing van de gebeurtenis (rejection to disaster) 6). Any (sarcastic) jokes about disasters whether it's true or not (e.g. @user: "I will find a new job sooner than they will find MH370.")
No	Confidence; Faith; Trust; to believe something did happen	E.g. 1) @user: "Debris were found in Vietnam, evidence shows it's from MH370. Horrific. 2) @user: "Last signal of MH370 was found above Southern Indian Ocean. It must be crashed into the ocean... #RIP 3) @user: "Another plane going down #MH370. Wow. @malaysianairlines."

Statistical Analysis

Chi-Square tests for independence were applied to test for a possible relation between the expression of emotions grief and disbelief in Tweets and the psychological distance of aviation disasters. In the end, results were compared cross corpora (grief MH17 vs. grief MH370 and disbelief MH17 vs. disbelief MH370) to test if psychological distance has any impact on the usage of grief or disbelief.

Results

A Chi-Square test (χ^2-test) showed that there is a significant relation between distance and the emotion grief (χ^2 (1) = 160,3 p < .001). Dutch citizens who tweeted on the matters of close stimulus MH17 expressed more often a grief sentiment in their Tweets (93,2%) in comparison with Dutch citizens that tweeted on the matters of distal stimulus MH370 (6,8%). Dutch citizens who tweeted on matters concerning MH17 expressed more often a grief sentiment (13%) than Dutch citizens who tweeted on matters concerning MH370 (1%). Also, Dutch citizens tweeting about MH17 produced fewer Tweets expressing no grief (87%) compared to Dutch citizens tweeting about MH370 (99%). Table 4 shows the exact figures. In the end, 13% of MH17 Tweets with a grief sentiment seems rather low, but compared with the Tweets coded with a grief sentiment for MH370 (1%) it is relatively high.

Table 4. Distance and grief. Crosstab of the counts of grief per distance (*N*=1482 for MH17 and *N*=1442 for MH370) and percentages within the distance.

Distance		Coded for grief		Total
		Yes	No	
MH17 (Close)	*Count*	192	1290	1482
		13,0%	87,0%	100,0%
MH370(Distal)	*Count*	14	1428	1442
		1,0%	99,0%	100,0%
Total	*Count*	206	2718	2924
		7,1%	92,9%	100,0%

Another Chi-Square test (χ^2-test) showed that there is no significant relation between distance and the emotion disbelief (χ^2 (1) = .160 p = .689). Dutch citizens tweeting about MH17 produced a similar amount of Tweets expressing disbelief (52,7%) as Dutch

citizens tweeting about MH370 (47,3%). Dutch citizens who tweeted on the matters of MH17 and MH370 expressed relatively the same (low) amount of disbelief (respectively 3,2% and 3,0%). Most Tweets for both MH17 and MH370 did not contain a disbelief sentiment (respectively 96,8% and 97%). Table 5 shows the exact figures. In the end, the usage of disbelief in Tweets for both MH17 and MH370 was rather low.

Table 5. Distance and disbelief. Crosstab of the counts of disbelief per distance (*N*=1482 for MH17 and *N*=1442 for MH370) and percentages within the distance.

Distance		Coded for disbelief		Total
		Yes	No	
MH17 (Close)	*Count*	48	1434	1482
		3,2%	96,8%	100,0%
MH370(Distal)	*Count*	43	1399	1442
		3,0%	97,0%	100,0%
Total	*Count*	91	2833	2924
		3,1%	96,9%	100,0%

Conclusion & Discussion

This research examined a possible relation between the psychological distance of aviation crashes and the usage of a grief and disbelief sentiment expressed by Dutch citizens on Twitter. Previous studies examined the relationship between stimuli and the way people experience these (Trope & Liberman, 2008; Trope & Liberman, 2009). According to Trope, Liberman and Stephan (2007) psychological distance affects the experience and opinion of stimuli for a person. The closer stimuli are, the more important these stimuli are for a person. The more distal stimuli are, the less important these stimuli are for a person (Trope, Liberman & Stephan, 2007). More specifically, other studies examined the relationship between (natural) disasters and the way psychological distance affects the representation and experience of these disasters as expressed by people on Twitter (Mollema et al., 2015; Van Lent et al., 2017; Stokes et al., 2016; Wang, Ye & Tsou 2016). However, evidence whether psychological distance has an impact on the use of grief and disbelief for close or distal aviation disasters expressed on Twitter was still missing. For this study, we examined close (MH17) and distal stimuli (MH370) and the use of the sentiments grief and disbelief as expressed on Twitter. Based on the Construal Level Theory and the influence psychological distance has on the

perception of stimuli for a person (Trope & Liberman, 2008) we formulated the following hypotheses:

H1: Dutch citizens express themselves with the sentiment grief more often when an aviation disaster is psychologically closer.
H2: Dutch citizens express themselves with the sentiment disbelief more often when an aviation disaster is psychologically more distal.

This study shows that there is a significant relation between the usage of grief and the psychological distance of aviation disasters. Dutch citizens showed more often a grief sentiment in their Tweets when regarding a close aviation disaster (MH17) than in their Tweets concerning the more distal disaster of MH370. Furthermore, no significant relation between the usage of disbelief and the psychological distance of aviation disasters was found. For both the proximal and distal aviation disaster, the usage of disbelief expressed on Twitter by Dutch citizens was rather low. Our results show that the first hypothesis (on grief) is accepted while the second (on disbelief) has to be rejected.

Discussion & limitations

For this research we took two random sample cases of 1500 Tweets. For MH17 this was taken out of a database consisting of 226,498 Tweets that used the keywords MH17 or #MH17 and for MH370 this was taken out of a database consisting of 1811 Tweets that used the keywords MH370 or #MH370. By using a random sample out of a database we ensured this study is representative for this population and thereby generalizable for the Netherlands for the seven days after the crashes.

As expected, our results show a significant relation between the expression of grief and distance. On the other hand, no relation was found between the distance of aviation disasters and the use of disbelief. For both MH17 and MH370 the usage of disbelief on Twitter was rather low. Dutch citizens are more likely to express themselves with a grief sentiment when tweeting on the matters of a close stimulus like MH17, while not expressing themselves with a grief or disbelief sentiment for distal stimuli like MH370. To answer our main research question, comments on proximal and distal aviation crashes did differ in the usage of sentiment grief.

The most obvious explanation for our results is, as discussed, the Construal Level Theory (Trope & Liberman, 2008). According to Trope, Liberman and Stephan (2007) psychological distance affects the experience of and opinion on stimuli by people. A possible explanation for our findings is that close stimuli are considered more concrete and detailed in comparison with distal stimuli (Trope & Liberman, 2010). With a more concrete and detailed representation of stimuli, humans could pay more attention to these stimuli and emotions could be stronger (Trope & Liberman, 2008). In our study we focussed on two emotions of the Grief Cycle Curve by Kübler-Ross (Tsao, 2010). The first step in this cycle is disbelief while the last step is grief. Therefore, we take grief as a more severe and stronger emotion than disbelief is. This shows in our results whereas grief is more expressed in Tweets regarding close aviation disaster MH17 in comparison with distal aviation disaster MH370. These results also connect with findings by Trope and Liberman (2008) where they state emotions could be stronger for close stimuli.

Based on the output of this study, governments and businesses can understand better which (aviation) disaster is stirring a society and act quicker and better on those disasters with focussed (social) media strategies. A good indication of psychological closeness of a close aviation disaster is when citizens tweet with the sentiment grief relatively often. In other words, when many Dutch Twitter users are using a grief sentiment in their Tweets on (aviation) disasters, the Dutch government can act on those certain disasters because our results show there is a significant relation between distance and grief. For instance, the government of China made a poor judgement call in informing the (later protesting) Chinese citizens regarding MH370 (Algemeen Dagblad, 2014) while this could be easily prevented with a proper communication strategy to inform and address those citizens.

It has to be taken into account that we used two emotions of the Grief Cycle Curve by Kübler-Ross (Tsao, 2010), which are related to the death and dying. Twitter is eminently suitable to track the public's opinion but it could be that people are reticent with divulging feelings regarding death and dying, especially when it is about their own families or loved ones, on a public platform like Twitter. Further research should clarify this.

Furthermore, by using several coders, our kappa for disbelief was relatively low (κ = .156). For further research, we should exemplify and improve our coding process with coders to establish a better reliability. Also, for this research we used only two

emotions and only two disasters. For follow-up studies, we recommend coding more than one proximal and one distal disaster for multiple emotions (e.g. most common used emotions expressed on Twitter) to determine that grief is not a fluke to recognize a close stimulus. Follow-up studies should improve and determine the range of emotions that are used for close and distal stimuli so governments and businesses can focus on a wider array of emotions to recognize close or distal stimuli better.

Literature

Amit, E., Algom, D., & Trope, Y. (2009). Distance-Dependent Processing of Pictures and Words. *Journal of Experimental Psychology: General Vol. 138*, 400–415, doi: 10.1037/a0015835.

Diddi, P., & Lundy, L. (2017). Organizational Twitter Use: Content Analysis of Tweets during Breast Cancer Awareness Month. *Journal of Health Communication*, 1-11, doi: 10.1080/10810730.2016.1266716.

Dijkstra, J. (2015). Social exchange: relations and networks. *Soc. Netw. Anal. Min.*, doi: 10.1007/s13278-015-0301-1.

Glowacki, E., Lazard, A., Wilcox, G., Mackert, M., & Bernhardt, J. (2016). Identifying the public's concerns and the Centers for Disease Control and Prevention's reactions during a health crisis: An analysis of a Zika live Twitter chat. *American Journal of Infection Control 44*, 1709-1711, no doi.

Hansen, J., & Wanke, M. (2010). Truth From Language and Truth From Fit: The Impact of Linguistic Concreteness and Level of Construal on Subjective Truth. *Personality and Social Psychology Bulletin 36(11)*, 1576-1588, doi: 10.1177/0146167210386238.

Jones, N., & Wojcik, S. (2016). Tweeting Negative Emotion: An Investigation of Twitter Data in the Aftermath of Violence on College Campuses. *Psychological Methods, Vol. 21, No. 4*, 526–541, doi: 10.1037/met0000099.

Jong, W., Duckers, M., & van der Velden, P. (2016). Crisis Leadership by Mayors: A Qualitative Content Analysis of Newspapers and Social Media on the MH17 Disaster. *Journal of Contingencies and Crisis Management, Vol. 24,* 286-295, doi: 10.1111/1468-5973.12124.

Kasperson, R., Renn, O., Slovic, P., Brown, H., Emel, J., Goble, R., et al. (1988). The Social Amplification of Risk A Conceptual Framework. *Risk Analysis, Vol. 8, No. 2*, no doi.

Kreilkamp, T. (1984). Psychological Closeness. *American Behavioral Scientist Vol. 27, No. 6*, 771-784, no doi.

Lalji, T. & Deshmukh, S. (2016). Twitter Sentiment Analysis Using Hybrid Approach. *International Research Journal of Engineering and Technology, Vol. 3, Iss. 6*, 2887-2890, no doi.

Mollema, L. et al. (2015). Disease Detection or Public Opinion Reflection? Content Analysis of Tweets, Other Social Media, and Online Newspapers During the Measles Outbreak in the Netherlands in 2013. *Journal of Medical Internet Research vol. 17, No. 5*, doi:10.2196/jmir.3863.

Soderberg, K., Callahan, S., Kochersberger, A., Amit, E., & Ledgerwood, A. (2014). The Effects of Psychological Distance on Abstraction: Two Meta-Analyses. *Psychological Bulletin Vol. 141, No.3*, 525–548, doi: 10.1037/bul0000005.

Stokes, C., & Senkbeil, J. (2017). Facebook and Twitter, communication and shelter, and the 2011 Tuscaloosa tornado. *Disasters, 41(1)*, 194-208, doi: 10.1111/disa.12192.

Trope, Y., & Liberman, N. (2010). Construal-Level Theory of Psychological Distance. *Pyschol Rev. 117(2)*, 440-463, doi: 10.1037/a0018963.l

Trope, Y., & Liberman, N. (2008). The Psychology of Transcending the Here and Now. *Science 322 (5905)*, 1201-1205, doi: 10.1126/science.1161958.

Tsao, C. (2010). Kubler-Ross Stages of Grief. *Psychiatry & Behavioral Health* .

Van Lent, L.G.G., Sungur, H., Kunneman, F.A., Van de Velde, B. & Das, E. (2017). Too Far to Care? The Role of Psychological Distance in Web-Based Public Attention and Fear for Ebola. *Journal of Medical Internet Research (forthcoming/in press)*, doi:10.2196/jmir.7219

Wang, Z., Ye, X., & Tsou, M. (2016). Spatial, temporal, and content analysis of Twitter for wildfire hazards. *Nat Hazards, Vol. 83*, 523–540, doi: 10.1007/s11069-016-2329-6.

Williams, L., Stein, R., & Galguera, L. (2014). The Distinct Affective Consequences of Psychological Distance and Construal Level. *Journal of Consumer Research, Vol. 40*, doi: 10.1086/674212.

Yoo, E., Rand, W., Eftekhar, M., & Rabinovich, E. (2016). Evaluating information diffusion speed and its determinants in social media networks during humanitarian crises. *Journal of Operations Management 45*, 123-133, doi: 10.1016/j.jom.2016.05.007.

Appendix

Tabel 7. Accountability for definitive choice when irregularities occurred for irrelevance

Tweet	Changed to
Tweet 616 RT @mh17_nl: We zijn een uur live en hebben eerste 100 volgers binnen. Dank en #PleaseRT! #bringthemhome #MH17 #nationalerouwdag	Relevant. It's a Twitter account that's spreading news about MH17.
Tweet 624 @MrsEkdom Gelukkig denk niet iedereen zo. En gelukkig hebben normale mensen een inlevingsvermogen. #MH17	Relevant. It's a reaction on another MH17 related tweet.
Tweet 637 @GuyVerhofstadt waar blijf je nu dan met je grote bek #Ukraine #mh17 Niksnut!	Relevant. It's a Tweet about one of Europeans leaders and his statements.
Tweet 639: RT @brusselmans: Waarom kunnen/durven @MinPres en Koning Willy dit niet tegen Putin zeggen? http://t.co/Xr1JNFR0Zr #MH17	Relevant. This user is wondering why the Minister President and King Willem Alexander can't stand up against Putin on MH17.
Tweet 645: Ah bon, de Belgische koninklijke familie in Eindhoven is vertegenwoordigd door prins Laurent #MH17	Relevant. It's a Tweet on the attendance of the Royal Family of Belgium at one of the memorials.
Tweet 647 Nu Zomergasten kijken. Blijkbaar live (of niet lang geleden opgenomen). Erg benieuwd en even wat anders dan #MH17 (al beginnen ze er wel mee)	Relevant. It's a Tweet that user wants something different to see than #MH17.
Tweet 955 @PeterAnshof En zo is dat!! #mh17	Relevant. It's a reaction on a user that tweets about MH17
Tweet 1227 "@Reuters: PHOTOS: The remains of #MH17 victims arrive in the Netherlands. http://t.co/3GwsWVN2m2 http://t.co/revfbJB0lK" Indrukwekkend	Relevant. As discussed in methods, all Dutch reactions on Tweets written in a different language are also relevant.
Tweet 1242 (and more similar cases) RT @rikwes66: hardly evidence w/o satpics RT @mpoppel: NEW: U.S. publishes trajectory of missile it says downed MH17 http://t.co/bILi7K3gH…	Irrelevant. Tweet is entirely written in English.
Tweet 1596 (and more similar cases) Vlug #MH370 Volgens gerugte lui die selfone en slimfone van passasiers aan boord van die vermiste vlug nog steeds	Irrelevant. Tweet is entirely written in South-African.
Tweet 2166 @acjvmillingen8 niet gelukt... Zit sinds MH370 weer op twitter.. :) komt wel...	Irrelevant. Tweet is not focussed on MH370, MH370 is cited as a timeframe (since MH370 I wasn't active on Twitter).

Tabel 8. Accountability for definitive choice when irregularities occurred for grief

Tweet	Changed to
Tweet 4 alle van deze vermisten, grote dacht aan de gezinnen en de natie... #MH17	Grief. This user is clearly thinking about family's and casualties.
Tweet 14 Het weten en beseffen is 1 ding, maar de beelden vanuit Eindhoven komen pas echt hard binnen. R.I.P. #MH17 .. Zeer indrukwekkende ceremonie.	Grief. This user understands the impact of this disaster when he sees the impressive ceremonial.

Tweet	
Tweet 25 (and more similar cases) RT @woahhquinty: deze gebeurtenis vergeet ik sws nooit meer.. het is zo erg ! #RIP #MH17 #PrayForMH17	Grief. This user is never forgetting the event of MH17 and thinks it's so sad. #rip #Mh17
Tweet 52 (and more similar cases) Oh wat vreselijk! Sterkte voor de nabestaanden! #MH17	No Grief. This user is wishing strength for relatives
Tweet 56 (and more similar cases) RT @nandarave: Het zal je geliefde maar zijn die je zojuist hebt uitgezwaaid en nu verpulverd op de grond ziet liggen... #MH17	No Grief. This user is placing the event of MH17 in perspective.
Tweet 70 Laten we hopen dat onze mensen heel snel terug in Nederland zijn!! #MH17 r.i.p	No grief. He wishes the remains of the victims a quick return to their motherland
Tweet 74 Jimi Hendrix - Angel (Lyrics): http://t.co/Hhfxz77uyO via @YouTube - voor de #MH17 - R.I.P.	No Grief. Only a song with hashtag RIP is not enough to code for Grief.
Tweet 94 "@AlexSnelleman: Krijg kippenvel bij dik 25 graden bij het lezen van dit bericht op Facebook. #MH17 http://t.co/XWbSINFdog" Tweet	No Grief. He gets chicken skin of reading a Facebook post.
Tweet 327 Dit is zo'n dag waarop ik mij bijna schaam dat ik gelukkig ben.... #MH17 #atackonGaza	No Grief. This user is happy he's alive and happy.
Tweet 341 RT @Cindyvanherk: Afschuwelijk om die beelden van het neergestorte toestel te zien. #MH17 De wereld is gek geworden. Wat intens #verdriet...	Grief. She is clearly mentioning grief in her Tweet.
Tweet 353 Wish you were here op #3fm. Altijd even een paar minuutjes stil om te denken aan lieve mama en vandaag ook alle andere overledenen #MH17	Grief. This user is taking a few minutes of silence for all casualties and his mom (probably passed away).
RT @vanderzande: Natte oogjes bij verhaal Puck (12), haar vriendinnetje zat in #MH17 en ze vraagt liedje voor d'r aan #3FM http://t.co/Xuaj...	No grief. This user is not talking about himself. He's describing a situation that happened on a radio station. That girl is clearly sad.
Tweet 937 RT @112rijnmond: RT @EricFeijten: Eindelijk naar huis. Intens verdrietig #MH17 @nosnieuws http://t.co/exY1mjAfHt	Grief. This user retweets a User and didn't add anything so we take the original Tweet's sentiment. In that Tweet, he says obviously mentions he's very sad.
Tweet 989 RT @wielerman: Eén minuut stilte bij de start, duizend gedachten #tdf #mh17	Grief. He's telling about a minute of silence for all victims at a cycling match. He's having thousand thoughts which implies he's sad. As discussed in Methods, this can be coded as 'mild sorrow'.

Tabel 9. Accountability for definitive choice when irregularities occurred for disbelief

Tweet	Changed to
Tweet 14 Het weten en beseffen is 1 ding, maar de beelden vanuit Eindhoven komen pas echt hard binnen. R.I.P. #MH17 .. Zeer indrukwekkende ceremonie.	No disbelief. Clearly.
Tweet 35 RT @Teun_vd_Heijden: En dan heb je dus ook nog dit soort mensen... #MH17 (@SSSukru_)	No disbelief. Clearly.

18

Tweet 40 RT @D_Gloudemans: Bizar, vanmorgen er nog een grap over maken, nu niet meer leven.. #MH17 #MalaysiaAirlines http://t.co/vJTEYHuyQF	Disbelief. He can't believe he made just a joke this morning and now they're dead.
Tweet 52 (and more similar cases) Oh wat vreselijk! Sterkte voor de nabestaanden! #MH17	No disbelief.
Tweet 56 RT @nandarave: Het zal je geliefde maar zijn die je zojuist hebt uitgezwaaid en nu verpulverd op de grond ziet liggen... #MH17	No disbelief. There are no signs of believing it did not happen.
Tweet 82 (and more similar cases) Vanmorgen condoleanceregister voor onze omgekomen collega getekend. Sprakeloos en ontroerd. Vigilat ut quiescant #MH17	No disbelief. He's says he's speechless and moved.
Tweet 96 Al sinds het horen van het nieuws proberen te begrijpen wat er in die debiel z'n harses zou zijn omgegaan om te schieten... #MH17	Doubtful but no disbelief. He's angry.
Tweet 363 RT @roelvanhees: Bizar... Geen echte leiding hier...overal brokstukken en duidelijk leeg gehaalde privé spullen #MH17 http://t.co/tmPGvCibKB	No disbelief. He knows it happened.
Tweet 375 Echt bizar en schokkend ... Sterkte aan alle betrokkenen #mh17 #waarom #laffehonden	No disbelief. He's shocked.
Tweet 378 RT @RapPlay73: Kijk met hoeveel respect de slachtoffers van #MH17 worden behandeld. Zie het verschil met dat tuig uit Rusland. http://t.co/...	No disbelief. He's tweeting about the respect the victims receive and the Russian scumbags who did it.
Tweet 399 (and similar cases) Hoor ik nou echt net in #eenvandaag dat de trein met slachtoffers van #MH17 vertrekt maar dat niemand weet waarheen?! #ohnee! Kan het erger?	No disbelief. This user is tweeting he can't believe nobody knows where the train is heading. Not an emotional statement on casualties or the disaster itself.
Tweet 618 (and similar cases) Besef nu pas de omvang van de ramp.. Al die lijkwagens achter elkaar.. #NOS #MH17	Disbelief. He just realized the impact of this disaster after seeing the funeral procession on TV.
Tweet 693 RT @geertgeel: Ongelofelijk, @Gielah Een paar dagen na de aanslag op #MH17 vuurt #Hamas raketten af op passagiersvliegtuigen in #Israël. In...	No disbelief. As discussed, "Ongelofelijk" is not the same as "Ongeloof"
Tweet 928 RT @KGFerrier: Verslagen door bericht dat wereldverbeteraars als Joep Lange en Pim de Kuijer in MH17 zaten. Mensen die de wereld niet kan m...	No disbelief. He's mourning about the loss of Joep Lange and Pim Kuijer.
Tweet 946 RT @Geert_RTLNieuws: Mijn reportage over AIDS-deskundige Joep Lange, dood na aanslag op #MH17. Zo gek om'm gister nog gesproken te hebben. ...	Disbelief. He can't belief he just spoke to him earlier and now he's dead.
Tweet 952 Geschrokken, ontdaan en vol ongeloof... Wij leven	Disbelief. He clearly mentions 'ongeloof'.

intens mee met alle nabestaanden van de omgekomen inzittenden van vlucht MH17.	
Tweet 1264 RT @M_Sepers: Niet met woorden te beschrijven...#tragisch #medeleven #slachtoffers #familie #sterkte #MH17 http://t.co/wsjjpzktPj"	Disbelief. He can't describe with words what happened.
Tweet 1275 Aanleiding WO I was moord Franz Ferdinand. Wordt neerhalen #MH17 aanleiding WO III?	No disbelief. He's wondering if this will start WWIII.
Tweet 1541 Wat freaky dat contact met Boeing 777 zomaar is verdwenen, op heel simpel deel van de vlucht. En 239 mensen aan boord, heel naar #MH370	No disbelief. He thinks it's freaky communication with MH370 got lost.
Tweet 1835 (and similar cases) RT @TPOnl: wtf? http://t.co/FKWrUOP0f2 Mobieltje van passagier #MH370 gaat gewoon over!	Disbelief. WTF. Mobile phone of passenger is still ringing. Implies they're still alive.
Tweet 1868 RT @ChunkrGames: Het is 2014, de #NSA kan personen tot op de meter nauwkeurig vinden, maar een vliegtuig? #mh370	No disbelief. He's angry they can't find it.
Tweet 2115 #MH370 dit is toch een bijzonder verhaal. Gestolen paspoorten, mensen die ingecheckt waren maar niet aan boord. #terrorisme of #ongeluk? Tweet 2126 Die olie is dus niet van #MalaysianAirlines #MH370. Het wordt steeds vreemder allemaal.	No disbelief. He thinks it could be an act of terrorism.
Tweet 2126 Die olie is dus niet van #MalaysianAirlines #MH370. Het wordt steeds vreemder allemaal.	No disbelief. He thinks it gets stranger every hour.
Tweet 2765 Nu op OMG: Video: Vlucht MH370 conspiracy: 'Kist staat op geheim vliegveld': http://t.co/7ytVpe6zmv #TPOnl	Disbelief. They don't believe it crashed. It's a conspiracy theory.